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Personality traits and risk of suicide mortality: findings from a multi-cohort study in the general population

Suicide is a global public health concern. While many fewer deaths per year are attributed to suicide (800,000) than to chronic disease, estimates suggest that, for every completed suicide, an additional 30-40 attempts are made. This equates to more than 20 million attempted suicides worldwide each year¹.

While poor mental health², low cognition³, social isolation⁴ and socio-economic disadvantage⁵ are related to suicide risk, the predictive role of other psychosocial characteristics such as personality type is uncertain. There is a circumstantial case for selected personality types being implicated in the occurrence of suicide. Observational studies, for example, suggest that low extraversion, high neuroticism, and low conscientiousness are associated with an increased prevalence of depressive symptoms⁶, a determinant of suicide². Lower conscientiousness has also been linked with an increased risk of heavy alcohol consumption⁷, a further risk factor for suicide⁸.

For the first time to our knowledge, we simultaneously related the five major personality components – conscientiousness, agreeableness, neuroticism, openness and extraversion – to suicide death by collating data from seven large cohort studies.

We pooled individual-participant (raw) data from five cohort studies with information on personality, key covariates, and suicide mortality: the UK Health and Lifestyle Survey (HALS), the original US National Health and Nutrition Examination Survey (NHANES 1), the US Health and Retirement Study (HRS), the Wisconsin Longitudinal Study Graduate Sample (WLSGS), and the Wisconsin Longitudinal Study Sibling Sample (WLSSS). We also incorporated results from remote, bespoke analyses of two further studies: the UK Biobank (UKBB) and the Miyagi Cohort Study (MCS) (study summaries available upon request).

Personality was assessed by using a range of questionnaires. In HALS (extraversion, neuroticism), NHANES 1 (extraversion, neuroticism, openness), UKBB (neuroticism), and MCS (extraversion, neuroticism), a selection of personality variables were captured, while in HRS, WLSG and WLSS all of the 'Big Five' traits were measured (extraversion, neuroticism, agreeableness, conscientiousness, and openness).

The covariates of education (primary, secondary, tertiary level), smoking (current, former/never), alcohol intake (light, heavy), and marital status (married/cohabiting, other) were self-reported and based on standard enquiries.

In all studies, death was ascertained from mortality records, with suicide denoted by any mention of the following events: suicide and self-inflicted poisoning by solid or liquid substances (E950-E959) and injury undetermined whether accidentally or purposely inflicted (E980-E989) according to ICD-9; and terrorism (U03.1 and U03.9), intentional self-harm (X60-X84), event of undetermined intent (Y10-Y34), sequelae of intentional self-harm, assault and events of undetermined intent (Y87), and sequelae of unspecified external cause (Y89.9) according to ICD-10.

A mean duration of mortality surveillance of 8.1 years of a total of 464,251 participants (3,782,553 person-years) gave rise to 270 suicide deaths. In the five studies for which we had individual-participant data, each of our covariates was related to completed suicide in the expected direction, although statistical significance at conventional levels was not always apparent: age (per decade increase: hazard ratio, HR=1.51, 95% CI: 1.19-1.92), gender (female vs. male: HR=0.37, 95% CI: 0.21-0.66), education (primary vs. secondary/tertiary: HR=2.40, 95% CI: 1.26-4.54), smoking (current vs. former/never: HR=1.89, 95% CI: 0.97-3.67), alcohol intake (heavy vs. light: HR=1.64, 95% CI: 0.36-7.44), and marital status (married/cohabiting vs. not: HR=0.59, 95% CI: 0.32-1.06).

In the main analyses in which the exposures of interest were the five personality types, adjusting for these covariates yielded the same results as those apparent after controlling for age and gender alone; we therefore present multiply-adjusted HRs only. Each one SD

increment in neuroticism was related to a 1.3-fold increase in suicide risk (HR=1.33, 95% CI: 1.18-1.50), while a one SD higher agreeableness score was associated with protection (HR=0.71, 95% CI: 0.53-0.97). After dropping data from UKBB (129 suicides) to examine if the largest study had skewed the results, we found that the risk associated with higher neuroticism was materially unchanged (HR=1.31, 95% CI: 1.11-1.55). We found no evidence that extraversion (HR=0.99, 95% CI: 0.84-1.17), conscientiousness (HR=0.98, 95% CI: 0.69-1.39), or openness to experience (HR=0.94, 95% CI: 0.69-1.29) were related to suicide rates in any of our analyses.

Each personality type was only weakly related to socio-economic status and health behaviours and, as a consequence, controlling for these factors did not have an impact on the personality–suicide relation. This implicates other explanations for the link between neuroticism and agreeableness on the one hand and suicide mortality on the other.

It seems likely that people regarded as being agreeable and less neurotic have a more extended or better established social network relative to individuals with less favourable scores on these traits. Social support, most frequently captured using marital status, is related to a lower risk of suicide⁹. Though the relationship of agreeableness and neuroticism with suicide was robust to the adjustment of marital status herein, we did not measure other potentially important characteristics of social integration – social network size, religious service attendance – that are known to predict suicide⁹.

In conclusion, the characteristics of empathy and cooperation that are synonymous with agreeableness appear to be related to lower suicide rates, while people with a tendency towards impulsivity and hostility, typical of a neurotically-prone personality, experience higher risk. Our observation that standard demographic risk factors (gender, education, marital status) were related to suicide risk in the expected direction gives us a degree of confidence in these novel results for personality. It might be that more attention should be paid to selected personality characteristics in suicide prevention.

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